



KNEE ACL RECONSTRUCTION POST-OPERATIVE GUIDELINES

Pre-Operative Phase

PRECAUTIONS

- Modify or minimize activities that increase pain and/or swelling
- Use appropriate assistive device as needed

TREATMENT RECOMMENDATIONS

- Patient education
 - Pre-operative care
 - Edema/effusion reduction (including elasticized wrap/tubing)
 - Activity modification
 - Basic home exercise program (HEP)
 - Post-operative plan of care
 - Gait training with expected post-operative assistive device
 - Education on weight bearing, edema control, what to expect day of surgery
- LE flexibility exercises (e.g., supine calf and hamstring stretches)
- Maximize knee ROM
- Core strengthening
- LE strengthening exercises
 - Ankle pumps, quadriceps sets, gluteal sets
 - Straight leg raises (SLR) in multiple planes, advance ankle weight as appropriate
- Balance/proprioceptive training
- Stationary bicycle: initially focus on ROM and progress to cardiovascular conditioning/leg strength

GOALS FOR PRE-OPERATIVE PHASE

- Minimal to no swelling
- **Knee PROM: full extension to 120° degrees flexion**
- Able to ascend stairs

EMPHASIZE

- Familiarization with post-operative plan of care
- Control swelling
- Knee ROM with focus on extension unless mechanically blocked
- Quadriceps contraction



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GUIDELINES Acute Care (Ambulatory Surgery): Day of Surgery

PRECAUTIONS

- Avoid excessive loading (standing, walking), prolonged sitting
- Avoid weight bearing without crutches
 - Adhere to instructed weight bearing progression
 - Avoid painful activities, including walking and exercising
- Do not place a pillow under the operated knee

TREATMENT RECOMMENDATIONS

- Patient education:
 - Edema management
- Transfer training
- Gait training per weight bearing status
- Range of motion
 - Seated knee AAROM flexion
 - Passive knee extension with towel roll under heel
- Quadriceps sets, gluteal sets, ankle pumps
- SLR, if able

CRITERIA FOR DISCHARGE

- Independent brace management if indicated
- Independent with transfers
- Independent ambulation with appropriate assistive device on level surfaces and stairs
- Independent with HEP

EMPHASIZE

- Independent transfers
- Gait training with appropriate assistive device
- Edema/effusion reduction (including elasticized wrap/tubing)
- PROM/AAROM (focus on extension)
- Quadriceps contraction



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GUIDELINES Post-Operative Phase 1: Weeks 0-2

PRECAUTIONS

- WBAT
- ROM: 0 – 90° by end of week 2
- Do not place pillow under operated knee
- Avoid *active* knee extension from 40° → 0° (if patella/quad tendon graft)

TREATMENT RECOMMENDATIONS

- Gait training with progressive WB as per physician instructions
- Patellar mobilization
- Initiate flexibility exercises
- Range of motion
 - AAROM knee flexion/extension to tolerance
 - Avoid active knee extension 40-0 (if patella/quad tendon graft)
- Stationary bicycle for ROM
 - Short (90mm) crank ergometry (requires knee flexion > 85°)
- Quadriceps re-education: quadriceps sets with towel under knee with neuromuscular electric stimulation (NMES) or biofeedback
- SLR flexion with brace locked at 0°
- SLR abduction, adduction, extension
- Calf strengthening unilateral → bilateral
- Leg press bilaterally in knee 80°- 5° arc if knee flexion ROM > 90°
- Proprioception board/balance system (bilateral WB)
- Edema/effusion reduction (including elasticized wrap/tubing), cryotherapy (no submersion), compression device, elevation, gentle edema mobilization avoiding incision
- Progressive home exercise program
- Upper body ergometry (UBE) for cardiovascular conditioning

CRITERIA FOR ADVANCEMENT

- Ability to SLR without quadriceps lag or pain
- Knee ROM 0°-90°
- Minimal pain and edema/effusion

EMPHASIZE

- Patellar mobility
- Full PROM knee extension
- Improving quadriceps contraction
- Edema/effusion reduction (including elasticized wrap/tubing)
- Compliance with HEP and precautions



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GUIDELINES Post-Operative Phase 2: Weeks 3-6

PRECAUTIONS

- WBAT, wean from crutches when quad control normalized
- D/C crutches when gait normalized
- Avoid active knee extension 40° → 0° (if patellar/quad tendon graft)

TREATMENT RECOMMENDATIONS

- Gait training WBAT- may still have brace locked at 0° and crutches pending concomitant procedures
- Progress knee flexion PROM/AAROM as tolerated
- Hip-gluteal progressive resistive exercises
 - May introduce Romanian Dead Lift (RDL) toward end of phase
- Hamstring strengthening (unless hamstring autograft)
- SLR progressive resisted exercises (PRE) in all planes
 - With brace locked at 0° in supine until no extension lag demonstrated
- Calf strengthening: progression from bilateral to unilateral calf raises
- Leg press progression bilaterally
- Functional strengthening
 - Mini squats progressing to 0°- 60°, initiating movement with hips
 - Forward step-up progression starting with 2"-4" and then progress
- Consider blood flow restriction (BFR) program with FDA approved device if patient cleared by surgeon and qualified therapist available
- Proprioception board/balance system
 - Progression from bilateral to unilateral weight bearing
- Edema/effusion reduction (including elasticized wrap/tubing), cryotherapy (no submersion), compression device, elevation, gentle edema mobilization avoiding incision
- Progressive home exercise program
- Stationary bicycle - progress to cardiovascular and power development for LE, transitioning off of UBE

CRITERIA FOR ADVANCEMENT

- Non-antalgic gait and discharged brace
- Minimal edema/effusion
- Good patellar mobility
- **Knee ROM 0°-130°**
- Ascend 6" stairs with good control without pain



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GUIDELINES Post-Operative Phase 3: Weeks 7-12

PRECAUTIONS

- WBAT unassisted, maximize ROM

TREATMENT RECOMMENDATIONS

- Core and UE strengthening
- Advance foundational hip-gluteal PRE
- Advance hamstring and calf strengthening
- Quadriceps strengthening
 - Isometric knee extension 60°
 - Open chain knee extension progression
 - At week 12 initiate PRE in limited arc 90°-40°
- Functional strengthening
 - Progress squats to 0°- 90°, initiating movement with hips
 - Continue forward step-up progression
 - Initiate step-down progression starting with 2"- 4" and then progress
 - Lateral and crossover step-ups
 - Lunges
 - Add weight to functional strengthening exercises when appropriate
- Advance BFR program to include weight bearing strengthening
- Advance proprioception training to include perturbations
- Edema/effusion reduction/prevention (including elasticized wrap/tubing), cryotherapy, compression device, elevation, edema mobilization
- Progressive home exercise program
- Can begin elliptical when able to perform 6" step-up with good form

CRITERIA FOR ADVANCEMENT

- No edema/effusion
- Full symmetrical knee ROM
- Single leg bridge holding for 30 seconds with level hips and effort felt in gluteals
- Symmetrical squat to parallel
- Ability to perform 8" step-down with good control and alignment without pain
- Balance testing and quadriceps isometrics **70%** of contralateral lower extremity



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GUIDELINES Post-Operative Phase 4: Weeks 13-26

PRECAUTIONS

- Initiate return to in-line jogging only when cleared by physician

TREATMENT RECOMMENDATIONS

- Flexibility exercises and foam rolling as indicated
- Total body strength and conditioning
- Advance foundational hip-gluteal, hamstring and calf progressive resistive exercises
- Open chain knee extension progression (if cleared by Surgeon)
 - At week 12 initiate PRE in limited arc 90°- 40°
 - Progress to 90°- 30°
 - Progress to 90°- 0° by end of phase
- Functional strengthening
 - Progress to single leg squats
 - Forward step-up and step-down progression
 - Progress lateral and crossover step ups
 - Progress lunges
- Initiate running progression
- Initiate plyometric progression
- Supplementing use of BFR for higher level strengthening
- Progress proprioception training
- Incorporate agility and controlled sports-specific movements
 - Starting with planned agility and progress to reactionary movements
 - Emphasize uncompensated movement strategies with acceleration and deceleration
 - Begin with linear movements, progress to lateral and then rotational
- Progressive home exercise program

CRITERIA FOR ADVANCEMENT

- Quantitative assessments of **>85%** of contralateral lower extremity
 - *Note that uninvolved side may be deconditioned; use pre-injury baseline or normative data for comparison if available*
 - Isometric quadriceps testing
 - Hop testing
- Proper functional movement patterns
- Completion of 6-month Return to Sport Testing



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GUIDELINES Post-Operative Phase 5: Weeks 27 - Discharge

PRECAUTIONS

- Avoid premature or too rapid full return to sport

TREATMENT RECOMMENDATIONS

- Gradually increase volume and load to mimic load necessary for return to activity
- Progress movement patterns specific to patient's desired sport or activity
- Progression of agility work
- Increase cardiovascular load to match that of desired activity
- Collaborate with certified athletic trainer (ATC), performance coach/strength and conditioning coach, skills coach, and/or personal trainer to monitor load and volume as return to participation
- Consult with referring surgeon on timing return to sport including any recommended limitations

CRITERIA FOR DISCHARGE

- Quantitative assessments of **>90%** of contralateral lower extremity
- Movement patterns, functional strength, flexibility, motion, endurance, power, deceleration, and accuracy to meet demands of sport

EMPHASIZE

- Return to participation
 - Begin with non-contact play and progress to contact play
 - Progress minutes with team in controlled practice setting before advancing to game situations
- Collaboration with Sports Performance experts
 - Encourage continued strength and conditioning maintenance



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Appendix: Modifications Due to Graft Type and/or Concomitant Surgeries

ACLR with Hamstring Autograft

- Therapeutic Exercise
 - Avoid active knee flexion and isolated loading of hamstrings (e.g., heel slides, leg curls, hamstring strengthening and flexibility exercises) for the first 4 weeks

ACLR with Osteochondral Allograft (all graft types)

- Weight Bearing (note that status may change per surgeon's preference)
 - Weeks 0-3 FFWB
 - Weeks 3-5 PWB
 - Weeks 5-6 WBAT

ACLR with Meniscal Repair (all graft types)

- Range of Motion
 - ROM likely limited to 90° flexion in brace weeks 0-6 if meniscal repair performed
 - Generally speaking, do not push flexion
- Weight Bearing (note that status may change per surgeon's preference)
 - Weeks 0-2 TDWB
 - Weeks 2+ WBAT

ACLR with Meniscal Radial or Root Repair

- Range of Motion
 - ROM likely limited to 90 degrees flexion in brace weeks 0-6 if meniscal repair performed
 - Generally speaking, do not push flexion
- Weight Bearing (note that status may change per surgeon's preference)
 - Weeks 0-4 TDWB
 - Weeks 4+ WBAT